Notice of Allowability	Application No.	Applicant(s)	
	10/771,748	PARK, JUN-SIG	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *the filing of application on 3, February, 2004*.

2. ☒ The allowed claim(s) is/are *1-21*.

3. ☒ The drawings filed on *03 February 2004* are accepted by the Examiner.

4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☒ All b) ☐ Some* c) ☐ None of the:
      1. ☒ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

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DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Alan T. McCollom on August 17, 2005.

The application has been amended as follows:

IN THE CLAIMS:

1. (Amended) An apparatus for producing a semiconductor device, comprising: a reaction chamber installed in a reaction furnace; a discharge port for removing from the reaction chamber reaction byproducts formed during ~~producing~~ production of the semiconductor device; a heater for generating heat to heat the reaction chamber; a hot fluid supply unit for introducing heat from the heater and the reaction chamber into the discharge port, the hot fluid supply unit comprising a fluid container for receiving a heat transfer fluid; a hot fluid generator adjacent the reaction chamber ~~in~~ inside the reaction furnace, the hot fluid generator defining a fluid channel for conveying the heat transfer fluid and transfers heat generated from the heater and the reaction chamber to the heat transfer fluid supplied from the fluid container; and a heat transfer element for transferring heat to the discharge port using the heat transfer fluid supplied from the hot fluid generator.

2. (Original) The apparatus according to claim 1, wherein the hot fluid generator comprises a conduit that defines the fluid channel.

3. (Amended) The apparatus according to claim 1, wherein the hot fluid generator comprises multiple fluid channels, each of said fluid channels including an on/off valve for opening or closing a passage for the heat transfer fluid.

4. (Original) The apparatus according to claim 1, wherein the hot fluid generator is located at an upper portion of the reaction chamber.

5. (Original) The apparatus according to claim 1, wherein the hot fluid generator is located at a side portion of the reaction chamber.

6. (Original) The apparatus according to claim 1, wherein the discharge port is connected to a vacuum pump via a vacuum pipe, and the heat transfer element comprises first and second fluid conduits, the first fluid conduit having a diameter larger than that of the discharge port, and forming a first structure with the discharge port which extends along the same axis as the discharge port, and the second fluid conduit having a diameter larger than that of the vacuum pipe, and forming a second structure with the vacuum pipe which extends along the same axis as the vacuum pipe.

7. (Original) The apparatus according to claim 6, wherein the heat transfer element is formed of a plurality of coil-shaped fluid conduits that are wound about the discharge port and the vacuum pipe.

8. (Original) The apparatus according to claim 7, wherein the spaces between the coil-shaped fluid conduits and the discharge port and vacuum pipe, respectively, are filled with a substance for facilitating heat transfer.

9. (Original) The apparatus according to claim 8, wherein the heat transfer substance comprises a metal.

10. (Original) The apparatus according to claim 1, wherein the heat transfer fluid comprises a gas or liquid.

11. (Original) The apparatus according to claim 10, wherein the heat transfer fluid comprises N_2 gas, He gas, Ar gas, or H_2O.

12. (Original) The apparatus according to claim 6, wherein when the heat transfer fluid is a gas, and the heat transfer element comprise nozzles for supplying the heat transfer fluid to the discharge port and the vacuum pipe.

13. (Original) The apparatus according to claim 1, the fluid container is disposed within a utility box.

14. (Original) The apparatus according to claim 1, further comprises a flow control element for controlling a flow rate of the heat transfer fluid from the fluid container.

15. (Original) The apparatus according to claim 14, wherein the flow control element is one of a mass flow controller and a flow meter.

16. (Original) The apparatus according to claim 1, which comprises a thermocouple for sensing and monitoring the temperature of the heat transfer fluid from the hot fluid generator.

17. (Original) The apparatus according to claim 16, further comprising a main controller for opening or closing an on/off valve formed at the multiple fluid channels based on the temperature of the heat transfer fluid which is sensed by the thermocouple.

18. (Original) The apparatus according to claim 1, wherein the reaction chamber is a deposition chamber for forming a silicon nitride film on a wafer using dichlorosilane and ammonia.

19. (Original) The apparatus according to claim 6, further comprising a conduit for transferring the heat transfer fluid from the hot fluid generator to the vacuum pipe.

20. (Original) The apparatus according to claim 19, which further comprises an on/off valve for permitting or preventing the flow of the heat transfer fluid supplied from the hot fluid generator.

21. (Original) The apparatus according to claim 1, wherein the heater is formed within the furnace adjacent the reaction chamber.

Allowable Subject Matter

2. Claims 1-21 are allowed.

3. The following is an examiner's statement of reasons for allowance: The closest prior art to Gu; Youfan (US 5,827,370 A). Gu teaches an apparatus (Figure 1; column 5; lines 19-51) for producing a semiconductor device (column 5; lines 19-21; Abstract), comprising: a reaction chamber (21; Figure 1; column 5; lines 19-21) installed in a reaction furnace[1] (Figure 1; column 5; lines 19-51); a discharge port (50; Figure 1; column 7; lines 24-30) for removing from the reaction chamber (21; Figure 1; column 5; lines 19-21) reaction byproducts ("polymerized TEOS molecules"; column 2, lines 28-30) formed during producing of the semiconductor device (column 5; lines 19-21; Abstract); a heater (not shown; inherent[1]) for generating heat to the reaction chamber (21; Figure 1; column 5; lines 19-21) – That Gu teaches a heater in his furnace is believed to be inherent in view of the unabridged definition of "furnace"[1]. "Heat" in a "furnace" can only be produced by a heater as suggested by the dictionary definition. Gu further teaches a hot fluid supply unit (125, 126, "heater", 54; Figure 1,3; column 12; lines 37-65; column 8; lines 55-65) for introducing heat from the heater and the reaction chamber (21; Figure

1; column 5; lines 19-21) into the discharge port (50; Figure 1; column 7; lines 24-30), the hot fluid supply unit (125, 126, "heater", 54; Figure 1,3; column 12; lines 37-65; column 8; lines 55-65) comprising a fluid container (126; Figure 1) for receiving a heat transfer fluid; a hot fluid generator (54; Figure 3; column 12; lines 37-65; column 8; lines 55-65) adjacent the reaction chamber (21; Figure 1; column 5; lines 19-21) outside the reaction furnace (Figure 1; column 5; lines 19-51) – independent claim 1.

As such Gu does not teach that Gu's hot fluid generator (54; Figure 3; column 12; lines 37-65; column 8; lines 55-65) is adjacent Gu's reaction chamber (21; Figure 1; column 5; lines 19-21) and inside (as independently claimed) Gu's reaction furnace (Figure 1; column 5; lines 19-51). There is no teaching or suggestion in Gu, or other relevent prior art cited below, that it would be obvious to relocate Gu's heat transfer fluid reservoir inside Gu's reaction furnace (Figure 1; column 5; lines 19-51).

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

US 6844273 B2

US 6807971 B2

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[1] Furnace *n* : an enclosed structure in which heat is produced (as for heating a house or for reducing ore). Merriam-

US 6689930 B1

US 6680420 B2

US 6517913 B1

US 6383300 B1

US 6361607 B1

US 6238514 B1

US 6197119 B1

US 6194628 B1

US 6193802 B1

US 6187072 B1

US 6159298 A

US 5928428 A

US 5827370 A

US 4940213 A

US 4608063 A

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the

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Webster's Collegiate Dictionary - 10th Ed. p.474

examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.